PACIFIC OCEAN DIVISION
U.S. ARMY CORPS OF ENGINEERS

GEOSPATIAL DATA and SYSTEMS (GD&S) IMPLEMENTATION PLAN

1.0 PURPOSE:

One primary purpose of this document is to ensure that GD&S within the Pacific Ocean Division, Corps of Engineers (POD) will be implemented in a fully integrated, division-wide manner with built-in systems hardware and software flexibility to maximize utility to our customers and to facilitate our POD business processes. Geospatial information transfer for the purposes of conducting business within the Division must be seamless if project and programming resourcing and execution are to occur on a division-wide basis. In order to gain efficiency and maximize service to our current and future customers, the POD GD&S technology must be: (1) totally integrated and compatible internally and; (2) built with the utility and flexibility to plug into our customers systems and produce products of immediate utility to our customers.

2.0 BACKGROUND

This document presents an implementation plan for advancing the use of geospatial data and systems within the Pacific Ocean Division. Geospatial data is defined as "information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth. This information may be derived from, among other things, remote sensing, mapping, and surveying technologies." (U.S. Executive Office of the President, 1994). The components of a geospatial data system are the computer hardware and software used to input, store, retrieve, manipulate, analyze, and plot/print geospatial data. Together, in this document, they are referred to as Geospatial Data and Systems (GD&S).

In April 1994, President Clinton issued an Executive Order (No. 12906) Titled: Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure. This Order established policies and timelines for geospatial data documentation, data standards, and requirements for public access to geospatial data. On August 1, 1996, U.S. Army Corps of Engineers Headquarters (HQUSACE) published Engineering Regulation 1110-1-8156, Policies, Guidance, and Requirements for Geospatial Data Systems. This Engineering Regulation (ER) outlined a policy, established mechanisms, and schedules for the USACE compliance with the Executive Order. HQUSACE directed that all USACE commands establish a GD&S Oversight Committee and Technical Committee, and a designated single GD&S point of contact with responsibilities to administer GDS technology in the command.

The objective of the plan is to provide a structure to ensure the orderly and fully integrated development of GD&S and the efficient, widespread utilization of geospatial data at Pacific Ocean Division.

3.0 SCOPE

This Implementation Plan (IP) describes the uses of GD&S within Pacific Ocean Division and provides a framework for GD&S implementation throughout the Division in line with regionalization of resources IAW the POD Strategic Plan.

3.1 General

As defined by the National Science Foundation, a geospatial data system is a computerized system for the input, management, analysis, and presentation of geographically referenced data. The ultimate goal of a GD&S is to represent the reality of the world on the computer, provide the answer to real-life questions regarding the data, and to allow modeling of what-if scenarios.

Using computers for mapping and spatial analysis has allowed great advances in data capture, data analysis, and presentation in several broadly related fields. Among these fields are: cadastral and topographical mapping, thematic cartography, engineering, geography, soil science, surveying and photogrammetry, rural and urban planning, facilities management, remote sensing and image analysis. These broad subject areas use GD&S technology as a set of tools for collecting, storing, retrieving, transforming, importing and displaying spatial data from the real world for a specific task. The organizations comprising the Pacific Ocean Division have need for data and automated analyses in these areas.

In this document we refer to taskings that serve to further integrate GD&S technology into the daily work environment of the Division or Districts as projects. Typical projects would include the implementation of GIS at HED, the integration of digital imagery into CADD, the integration of GPS technology into the design work processes, etc. Projects may be single-year or multi-year and must include the funding source.

3.2 Responsibilities

3.2.1 Geospatial Oversight and Technical Committee, Pacific Ocean Division, DIVISION-Level.

The Director of Engineering and Technical Services or his appointed representative will chair the Geospatial Oversight and Technical Committee. The chairperson will also serve as the Division GD&S point of contact (POC). The Geospatial Oversight and Technical Committee will be made up of the Directors (or their designated representatives) from the Directorates of Engineering and Technical Services, Emergency Management, Real Estate, Information Management, Programs Management and other Directorates as deemed appropriate by the Chairman. The Committee will also include representatives from the four (4) assigned districts. The Division Geospatial Oversight and Technical Committee will set policy, provide guidance and future direction and monitor development of geospatial systems throughout the Division IAW POD and USACE goals and will be responsible for fulfilling Division responsibilities as outlined in ER 1110-1-8156.

The Committee will set out yearly goals in the form of technical guidance. The Districts must adhere to this guidance. To ensure that these goals receive the necessary priority, the Division and Districts will included them in their Operating Budget. The IM member of the Committee will perform the necessary interface between the IM Steering Committee and the GD&S Committee to ensure policy and guidance are consistent between the two bodies and information interchange remains current. Projects approved by the GD&S Committee will not require additional IMSC approval.

3.2.2 Geospatial Oversight and Technical Committee, DISTRICT-Level

Each District will appoint a Geospatial Oversight and Technical Committee chaired by the Chief of Engineering Division (or equivalent, where the engineering and construction functions are combined into one Division) or his

designated representative. (At the discretion of the Chairman of the Oversight Committee, the Chairman can appoint a separate Technical Committee and designate its membership in accordance with the requirements as stipulated in ER 1110-1-8156. When this occurs, the division of responsibilities will be in accordance with ER 1110-1-8156.)

The Chairman of the District Technical and Oversight Committee will appoint a District GD&S POC who will administer the GD&S program at the District and disseminate guidance and information. The membership of the Committee(s) will include representatives from Engineering, Construction, Emergency Management, Real Estate (where applicable), Information Management and Programs and Project Management Divisions as well as other Divisions as deemed appropriate by the Chairman. The IM member of the Committee(s) will ensure consistency between the proceedings of the Committee(s) and the IM Steering Committee (IMSC). Committee members representing their respective organizations will submit potential projects (as defined in Paragraph 2.1) to the Committee(s) for their consideration. The Committee(s) will be responsible to develop plans for implementation and development of all geospatial projects for systems within their districts in conformance to Division and District established goals and criteria.

The Committee(s) is not a funding source. However, to determine the viability of execution of projects, the Committee(s) will integrate itself into the PBAC and budget process for planning purposes to ensure that adequate funding streams are available and feasible to support the implementation of the proposed plans and/or that the size and phasing of the projects are appropriate with regards to both available funding and established policy guidance. The projects will be developed and approved by the District Committee(s). On a yearly basis, the District Committee(s) will submit to the Division G,D,&S Committee their pending list of projects for informational purposes as it is inserted into the PBAC process. Once funding is secured via the PBAC process, the appropriate District Committee will assign responsibilities for implementation and reporting requirements. The Oversight Committee will monitor and evaluate system development and ensure the system meets the requirements of the plan with respect to regulations and standards. Upon completion of implementation the Oversight Committee will determine if the system has met the objectives of the plan.

3.3 Uses

The Pacific Ocean Division uses GD&S technology to support a wide variety of planning, design, and operational and maintenance activities. At a minimum, Implementation and Development Plans will be developed for the following systems.

3.3.1 Global Positioning System

To support topographic survey efforts.

3.3.2 CADD System

To support both civil works and military engineering, design and planning functions.

3.3.3 GIS System

To support our planning, design, environmental, real estate, emergency management and related functions.

3.4 Implementation and Development Plans

Implementation and development plans will discuss the following requirements.

3.4.1 Needs Assessment

The Pacific Ocean Division and the assigned Districts interact with a large number of internal and external customers who have requirements for GD&S data. Data compatibility with all interrelated external customers is important. Consequently, any GD&S implemented must be an open system in order to be successful. In defining a workflow for GD&S, consider the following questions:

- Who is the customer (internal or external)?
- What hardware platform and software does the customer have?
- What training is required for the staff?
- Can data be imported and exported with Pacific Ocean Division's existing systems?

Sharing data must be a high priority for all groups.

3.4.2 Communication

Implementation plans must address interconnectivity and sharing of data between the Districts and the Division.

3.4.3 Technology Evolution

Managers involved in decision making related to the implementation of GD&S technology need to keep up with current advancements and future directions in the field. The implementation will address flexibility and the need to constantly adapt to new technology.

3.4.4 System Hardware

System hardware and selection and purchase must follow normal industry and Government standards. The objectives of the standards are to: 1) reduce system costs by easing information maintenance and transfer; and 2) protect technical assets and staff time by ensuring products compliance to the standards. All plans will comply with these standards.

3.4.5 Software

Before purchasing GD&S software, it is important to have a clear understanding of the goals of the organization. It is unlikely that one software package or one software vendor will be able to satisfy the needs of all organizations. The process of software selection should include such criteria as: compatibility with current and future network environment, compatibility with existing systems, compatibility with customers, type of product to be required, type of platform it will run on, and government and industry standards.

3.4.6 Data Management

The plan will address data access, management, storage and archiving. In general, all systems designs will ensure the accessibility of all data into all who are required to use it. Data format will conform to tri-service standards. Data input and maintenance will be addressed in the plan and will be the responsibility of each specific office.

The Directorate of Information Management (IM) be responsible for performing by in-house or contract means such duties as: ensuring logical consistency and topology between varying offices GD&S data, loading purchased or contractor provided data sets into the GD&S, providing data exports to outside requestors, and establishing appropriate database table and drawing file access privileges.

3.4.7 System Costs and benefits

All plans will address cost and budgeting requirements. Cost will include all significant hardware, software, training, data acquisition, maintenance, miscellaneous contract and labor cost. Benefits will be quantified to the maximum extent possible and discussed with relation to cost in the plan. Benefits will include easier data entry, data manipulation, data analysis, faster data output, and manpower savings.

3.4.8 Milestone Schedules

Short-term and long-term milestones should be established so that evaluations can be performed and progress can be reviewed regularly. These milestones will incorporate funding and acquisition strategy.

4.0 METADATA REQUIREMENTS

Executive Order 12906 which mandates that the Federal agencies document all new geospatial data sets according to the format prescribed by the Federal Geographic Data Committee (FDGC). It also requires that the documentation and data be made electronically available to the National Geospatial Data Clearinghouse.

The U.S. Army Corps of Engineers is a major player in the geospatial data arena and it expends significant resources on mapping. Conscientious metadata creation provides a tool for maintaining data quality control, data quality assurance, data audit trails, and data genealogy. This data documentation is not a arcane exercise in bureaucratic science; instead, it is a useful tool in assuring the durability and repeatability of Corps engineering analysis. Progress on metadata implementation will be reported quarterly to the GD&S Oversight and Technical Committee.

5.0 INFORMATION SHARING AND LESSONS-LEARNED PROGRAM

The Committees will ensure an information sharing and lessons-learned program is established within each District and circulated among Division and Districts. Electronic mail will be utilized for this purpose. IM will establish an e-mail bulletin board area to document, store, and disseminate this information. GD&S use by each group during the initial implementation can be recorded by mailing commentary to the e-mail bulletin board which can then be read by all interested parties. Items could include:

- Hardware problems and solutions.
- Network and database access procedures and problem solutions.
- Data format and acquisition problems and solutions.
- Data conversion difficulties.
- Creation and maintenance of shared spatial databases.
- Any other information which will be beneficial to using the GD&S.

The Committees within each District and the Division will administer this program.

6.0 INTERIM IMPLEMENTATION PLANS

At the discretion of the District Committee(s), interim implementation plans may be approved until a full plan can be developed in order that items previously budgeted for can be approved for purchase without undue hardship. In most cases, this will involve CADD purchases as CADD equipment will have been approved for purchase prior to publication of this implementation plan. In general, the Committee must be satisfied that the equipment to be purchased will not compromise the foreseeable future development of any geospatial system. The interim plan must specify the type of equipment, what it is to be used for and how it fits into future systems development. The interim plan must also state when the final implementation plan is to be developed.

7.0 EVALUATION PLAN

7.1 Geospatial Data and Systems Committees - DIVISION

The GD&S Committee will meet twice a year at a minimum or as required to address policy issues, set out annual goals, review progress and review plans and reports prepared by the District Committees. The Committee may also recommend projects to the District for District evaluation, and if feasible, implementation when a Division-wide initiative is being evaluated.

7.2 Geospatial Data & Systems Committees - DISTRICT

At the District, each group responsible for implementation of an active GD&S project will have a representative on the Geospatial Data Technical Committee. The representative should be a high-level system-knowledgeable user and be capable of making technical decisions for the Section represented. The representative will report to the District GD&S Committee on a quarterly basis or at major project milestones on project development and status of actions. The District GD&S Committee(s) will meet as required in ER 1110-1-8156 and will report to the Division GD&S Committee on the status of projects on a semi-annual basis.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Pacific Ocean Division has many technical responsibilities and automated applications that may be grouped under the heading of GD&S. We have recognized the value and benefits of integrating these responsibilities and systems on a Division-wide basis. We perceive that each technical division has some knowledge of GD&S and understands the advantages of having a system.

Since 1990 there has also been significant growth in computer hardware and software technology. Pacific Ocean Division's infrastructure has matched this technology expansion and now allows us to easily adapt to the GD&S concept and way of doing business. Based upon our assessment of the current needs, conditions, and capabilities, the following will occur for Pacific Ocean Division implementation of GD&S technology:

A. GD&S usage will be consciously expanded into the areas of planning studies, master planning, coastal process studies, regulatory programs, emergency operations, Real Estate and HTRW studies.

B. Guidelines and procedures will be established to ensure the data we collect or generate is in standard formats that allow efficient transfer between systems.

C. Prevailing standards will be adhered-to with respect to GD&S hardware and software purchases and implementation requirements.

D. Metadata guidance will be established to meet USACE Clearinghouse requirements.